# Service Manual

# cryoflow 700/1000

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Art. Code  300.219 to 300.224 and 300.275

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## Revision directory

| Date | Rev. | From device No.: | Changes/remarks |
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## Enclosures

| | |
|---|---|
| Wiring plan 989.030 Sp Bl 1 "Cryoflow 700/1000 Unit Wiring" | Rev. 1.3 |
| Wiring plan 989.030 Sp Bl 2 "Cryoflow 700/1000 Keyboard" | Rev. 1.4 |
| Drawing "Keyboard circuit card (A200)", | 09.06.03 |
| Drawing "Block diagram Cryoflow 700/1000" | 26.05.03 |
| Drawing "Disassembling housing/treatment tube" | 06.06.03 |
| Drawing "Tube connection, device" | 10.06.03 |
| Drawing "Handle" | 10.06.03 |
| Drawing "Power unit PT 45 C" | 06.06.03 |
| Drawing "Valve cooling circuit" | 06.06.03 |

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## 1. General remarks

**Cryoflow 700/1000** is a mobile therapeutic device, which with the help of a compressor cools a heat exchanger. Room air is blown by this heat exchanger and it is cooled to -30 °C. This cold air gets to the skin surface of patients to be treated via flexible tube.

Only accessories and spare parts, listed in the corresponding documentation for **Cryoflow 700/1000** (for example, instructions for use, spare part list, price lists) can be used. The actual prices for accessories and spare parts can be obtained from suppliers.

The **Cryoflow 700/1000** cannot be transported over longer distances, while lying, to avoid damages to the cooling circuit or compressor. There are no problems with normal transport on the rolls of the device of tilting or lying the device down for short periods. Each time that the device has been laid down, you must wait at least 30 minutes before turning it on.

Before putting the **Cryoflow 700/1000** into operation, read the instructions for use carefully. Power supply can only take place to a correctly installed isolated ground socket.

Before opening, the device is to be removed from the mains voltage.

Service work, including opening of the device can only be done by people, authorized by the manufacturer.

We continuously try to keep our products in line with state-of-the art technology. Thus, we reserve the right to make changes.

## 2. Technical data

| | |
|---|---|
| Power supply | 230 V ± 10 %, 50/60 Hz<br>115 V ± 10 %, 50/60 Hz |
| External electrical fuses | 16 A at 230 V<br>20 A at 115 V |
| Device fuse | T10 A E at 230 V<br>T16 A H at 115 V |
| Power consumption max. | 1000 VA |
| Protective category | I |
| Protective type | Type B |
| Degree of protection | IP 21 |
| Treatment duration | Time operation: 1 to 595 minutes, permanent operation |
| Air adjustment | 10 steps |
| Air volume, max. | 700 or 1000 l/min |
| Cooling circuit | maintenance free, closed circuit, |
| Coolant | R 404 A |
| Dimensions (D xW x H) | 550 mm x 365 mm x 1050 mm, |
| Weight, approx. | 85 kg |
| Operating conditions | +10 °C to +40 °C environmental temperature |

# 3. Functional description

**(See drawing: "Block diagram ")**

## 3.1 Cold circuit

The cold circuit is indicated on the block diagram with a thick black line.
Cold air is generated in a closed cooling system, filled with the coolant R404A. The filled quantity is indicated on the plate in the device.
The compressor (6) compresses the gaseous coolant from an initial pressure at the environmental temperature of approx. 0.6 MPa to an operating pressure of 2.5 MPa. Depending on operating condition, the maximum temperature of the compressed coolant can be approx. 90° C to110° C. The compressed gaseous coolant gets into the condenser (5). The fan (5) blows room air through the condenser (5). The coolant is cooled and liquefies at a temperature below 55° C. The pressure of the liquid coolant is approx. 1.8 MPa. The air flow of the fan (5) also cools the surface of the compressor (6). The fan (5) operates at maximum speed and is not regulated.
The coolant gets into the evaporator (2) thanks to the mechanical filter (4) and valve (3). It is spread by the nozzle of the valve (3) The heat exchanger (7) cools. The valve (3) has a temperature-dependent adjusting device, that adjusts the quantity of coolant in such a way that only minimum temperatures to approx. -40 °C can occur in the evaporator (2). The pressure in the evaporator (2) is 0.15 MPa to 0.2 MPa.
The evaporator (2) is designed so that only gaseous coolant can get back into the compressor (6).
Room air is sucked through the filter mat (8) of the fan (1), blown through the heat exchanger (7) and then gets to the treated surface cooled.
Moisture is removed from the room air in the heat exchanger (7). It freezes and precipitates as snow. If the cold system is switched off, the snow melts and the liquid collects in the water vessel (12).

## 3.2 Regulating coldness

The temperature sensor (9) measures the real temperature on the evaporator (2). The computer (A100) evaluates the signal analogously and at a lower temperature limit (- 30 °C) it switches off the compressor (6) and fan of the condenser (5) via the Optor relay and at an upper temperature limit (- 25 °C) turns them back on.
With this regulation, the compressor operates in an optimum operating range.

## 3.3 Cold air control

When treatment is started, the Opto relay (11) turns on the ventilator (1). The air flow of the ventilator (1) can be changed in 10 steps. For this purpose, a pulse-wide modulated signal is generated by the computer (A100) with a base frequency of approx. 6 kHz, whose periodic has different impulse break ratio, depending on the air level (20 % at air level 1 to 100 % at air level10). When treatment is stopped, the Opto relay (11) turns off the ventilator (1).

### 3.4 De-icing

During treatment, snow (3.10 forms in the heat exchanger. After a few hours, this snow strongly reduces the set cold air flow (3.3). The heat exchange is no longer optimum and the temperature of the cold air increases.
The heat exchanger (7) should be de-iced, to return to normal operating conditions.
When the device is turned off, the snow melts completely in about 5 hours.
The resulting water flows into the water vessel (12).
An operating key can also trigger de-icing (see Instructions for use, 7). The Opto relay (10) turns off the compressor (6) and the ventilator of the compressor (5). The ventilator (1) is turned on by the Opto relay (11) and warm room air is blown through the heat exchanger (7). Complete de-icing takes approx. 30 to 40 minutes at a room temperature of 23 °C.
If the heat exchanger (7) reaches + 8 °C, de-icing is automatically stopped.
The same operating key can be used to stop de-icing.

### 3.5 Measuring fill level

Water gets into the water vessel (12) due to de-icing (3.4).

**From device number 00101 to device number 00325**
There is a turnable float with a magnet in the water vessel. At a certain water quantity, the magnet turns on the level switch (13) (glass tube switch). The compressor (6), ventilator of the condenser (5) and the ventilator (1) are turned off. A message appears on the display, mentioning that the water vessel (12) should be emptied.
The level switch (13) is opposite the magnet, on the rear of the recipient for the water vessel (12). To replace the level switch (13) the recipient of the water vessel (12) and right side wall (5.1) must be screwed off.

**From device number 00326**
There is no float with magnet.
3 pressure switches are used as level switch. They are located under the movable recipient of the water vessel (12). From a certain weight of the water vessel (12), they come on. If the pressure switches are defective, the recipient for the water vessel (12) must be changed.

## 4. Errors

Abbreviations: SA: Service Instructions
GA: Instructions for use

| No. | Error | Possible causes, measures | See |
|---|---|---|---|
| 1 | Crash software:<br>seldom<br><br>often<br><br>reproducible | <br>► Turn off device and turn it back on after 3 minutes<br>► Control + 5 VDC to computer A 100 (5,00 V to 5,05 V)<br>► Replace computer A 100 | <br>GA: 11.1<br><br>SA: 6.1<br><br>SA: 5.2 |
| 2 | Poor contrast display | ► Adjust contrast<br>► Control + 5 VDC to computer A 100 (5,00 V to 5,05 V)<br>► Insert plug-in connector for CCFL illumination onto computer<br>There is high voltage<br>► Display is defect | GA: 5.4<br>SA: 6.1<br><br>SA: 5.1<br><br><br>SA: 5.1 |
| 3 | Poor cooling | ► Check filter mat<br>► Fan for cooling condenser (M003) must be operating<br>► No ice can form to the compressor on the coolant return line<br><br>► Check temperature sensor (RT001)<br>► Extreme environmental conditions<br>► Have cooling circuit checked (leak, compressor or valve defect, adjust valve) | GA: 11.1<br><br><br>SA: 6.2<br><br><br>SA: 6.3<br><br>GA: 10.<br>SA: 5.4<br><br>SA: 6.2 |
| 4 | Low air flow | ► Replace filter mat<br>► The silicone tube in grip treatment tube has turned (test: the grip tube can be turned in handle or in the device connection)<br>► Check fixation fan and air guide in the device<br>► Check fan (M002)<br>Test: Pull Bu 001 on fan, fan operates at maximum speed<br>► Ice on heat exchanger | GA: 11.1<br>SA: 5.3<br><br><br><br><br>SA: 5.1<br><br>SA: 5.1<br><br><br>GA: 11.1 |
| 5 | Compressor does not switch off | ► Check temperature sensor (RT001)<br>► Opto relay (K001) does not switch off<br>► Fan for cooling condenser (M003) must operate<br>► Have cold circuit checked | SA: 6.3<br><br>SA: 5.1<br>SA: 5.1<br><br>SA: 5.4 |
| 6 | Water flows from the device | ► Leak in tube guide from heat | SA: 5.1 |

| | | | |
|---|---|---|---|
| | | exchanger to water vessel<br>► Leak in water vessel<br>►Check level switch (S002)<br>► No ice can form to compressor on the coolant return line | SA: 3.5<br><br>SA: 6.2 |
| 7 | Handle and tube iced | ► Normal after longer operation and higher air humidity | GA: 11.1 |
| 8 | Compressor is on for a long phase, without the fan for cold air (M002) coming on (long ready phase of device) | □ Switch-on phase is normal at:<br>Room temperature to 24°C < 18 Min.<br>Room temperature to 28°C < 22 Min.<br>Room temperature to 32°C < 27 Min.<br>□ If values are greater, proceed according to 3 of this error table. | GA: 10. |

## 5. Assembling/disassembling

### 5.1 Opening the device

**(See drawing "Assembling housing/treatment tube“)**

Remove the plug from the socket before opening the device.

**Tool for opening the device:**

- Hexagon angle screw driver
  for hexagon socket head cap screws, 2.5 mm
- Cross recess screw driver, Phillips size 2

**These components are located in the console (1)**

- ► Computer card circuit (A100)
- ► Key board cad circuit (A200)
- ► Display (A500)

**These components are located to the right behind the side wall (2)**

- ► Power supply (A300)
- ► Mains filter (A200)
- ► Opto relays (K001, K002)
- ► Connection X 019 (RT001, SOO2)
- □ Plate with filled quantity for RA404A

**These components are located to the left behind the side wall (3)**

- ► Distributor box (A400)
- ► Valve on heat exchanger
- ► Connection Bu 001 (M002)

**Open up console (1):**

**(1.1)** ● screw out 4 hexagon socket head cap Screws under the console,
Fold up console in the direction of the mains switch

**Remove (2.1) right side wall (2) :**

**(2.1)** ● loosen 2 hexagon screws, but do not screw them out

**(2.2)** ● Screw out 2 cross recess screws

**Remove left side wall (3):**

● See removing right side wall (2)

**(3.1)** ● screw out additional 1 cross recess screw

**Remove rear wall (4):**

**(4.1)** ● screw out 4 cross recess screws

**Remove front wall (5):**

- ● Remove right side wall (2)
- ● Remove left side wall (3)
- ● Screw out 4 cross recess screws

## 5.2 Electronic sub-assemblies

All electronic sub-assemblies are connected with plug-in connectors or screwed terminals. Sub-assemblies are easily accessible after the device is opened (5.1).

**Tool for changing sub-assemblies:**

| | |
|---|---|
| Drew driver for recess screws: | Size 3 mm, 5.5 mm,<br>8 mm (air tube in device, M002) |
| Screw driver for cross recess screws: | Phillips size 2 |
| Open end wrench | Width 5 mm, 5,5 mm, 7 mm, 8 mm,<br>14 mm (safety holder),<br>27 mm (mains line) |

## 5.3 Treatment tube

### 5.3.1 Replacing treatment tube

**(See drawing "Disassembling housing/treatment tube")**

**Remove tube (6):** **(6.1)** ● screw out 4 cross recess screws

Other tool: screw driver for cross recess screws Phillips size 2

The complete tube can be pulled out of the heat exchanger (device) with the flange.
Insert the new tube into the heat exchanger and fasten it with the 4 screws. Make sure that the sealing rubber is not damaged.

### 5.3.2 Aligning silicone tube

**(See drawing "Tube connection, Device " and "Handle")**

If the quantity of cold air through the treatment tube is strongly reduced, the inner silicone tube is possibly twisted and is not smooth on the ripple tube.

**These are possible causes of twisting:**

**A:** (See drawing "Tube connection, device")
 Part (3) can twist in Part (4)

**B:** See drawing "Tube connection, device"
 Ripple tube can twist into part (3)

**C:** See drawing "Handle"
 Ripple tube can twist into Part (7)

**Control:**

**To A, B:** Hold ripple tube on the end of the flange (5) and try to turn it with slight pressure

**To C:** Hold handle and ripple tube and try to turn them against one another

with slight pressure

**The final confirmation, whether the silicone tube is twisted, results from visual control in the inside of the treatment tube.**
The treatment tube is to be screwed from the device according to 5.3.1.

Other tool: cross recess screw driver, Phillips: size 1
Screw driver for recess screws: Size 3 mm

Material: Cable binder 165 mm X 2,5 mm, 4 pieces
Zyanakrylat-adhesive (second quick adhesive), 0.5 mL

**Visual control:**
(See drawing "Handle")
 Screws (1) must be loosened
Remove cap (3) and clamp ring (4)
 The treatment tube must be held in stretched length against the light and it must be looked through it

**Repair:**
**To A, B:** (See drawing "Tube connection, device")
 Loosen screws (1)
 Parts (2), (3) and (4) must be removed from the flange (5)
 Part (2) with the silicone tube is to be removed from parts (3) and (4)
 Part (3) is to be held and is turned with part (2) so that it is smooth on the ripple tube .
(Sometimes, a round rod, for example, a broom handle should be inserted. With such a help, the twisting of the the silicone tube can be easily carried out.)
 If the holes for the screws (1) are turned against one another, they must be aligned.
 The cable binders which is in part to hold the silicone tube on part (2) are to to be cut. Part (2) is to be turned in the silicone tube so that the holes match again. The silicone tube is to be fastened with two new cable binders to part (2).
 The ring (4), must be glued to part (3).
The ring (4) is to be spread with a screw driver. A few drops of glue are to be placed in the opening between ring (4) and part (3). The screw driver is to be removed.
 If the ripple tube moves in part (3) it is to be glued on several sites with the part (3). An opening is created between the ripple ruge and the part (3) by a screw driver, in which a few drops of glue are placed.

**To C:** (See drawing "Handle")
 Parts (5), (6) and(7) are to be removed with the ripple rube with the handle (I8).
 If the ripple tube moves in the part (7), it must be glued at several sites with part (7). An opening is to be created between the ripple tube and part (7) with a screw driver. A few drops of glue are placed into this opening.

**ATTENTION**
Before and during gluing, it must be ensured that the holes for the screws fit and are not twisted.

After assembling the treatment tube to **Cryoflow 700/1000** the ripple tube cannot turn when the handle is hung into the hole on the device. If there is such a twisting, the tube connection is to be aligned to the device according to **A;B** and glued again.

### 5.4 Cold circuit

**(See drawing "Block diagram")**

**Repairs and replacing of sub-assemblies within the closed cold circuit are to be performed only by an expert company for cold or air conditioning technology.**

**When the cold circuit is filled, attention must be paid to:**

- ► The quantity of required coolant is on the plate near the power supply unit. Depending on design, 500 grams to 700 grams are to be filled in.
  **The indicated filled quantity on the plate must be complied with (± 10 g).**
- ► Before the cold circuit is filled, a vacuum pump is to be connected and operated longer than 30 minutes.
  The measuring device of the fittings must have sufficient vacuum for this coolant.
- ► Filling must be done with liquid gas. The gas bottle is thus to be set with the head on a balance. The weight difference between beginning and end of filling (first step and second step) is the filled quantity.

**First step:** -compressor is switched off
- Liquid gas is let in, approx. 50 % of the indicated filled quantity
- Turn off gas bottle

**Second step:** - Switch on compressor
- Open gas cylinder
- Fill rest quantity

# 6. Settings

## 6.1 Power supply unit voltage

**(See drawing: "Power supply unit PT 45 C")**

Console and right side wall are to be removed according to 5.1.

Other tool: Screw driver for recess screws, size 3 mm
Measuring instrument: Voltage measuring instrument range 10VDC

Control of +5 V on plug-in socket con 112 (Pin 2, 3) on the controller board (A100)
and the setting of this voltage with R7 on the power supply unit (A300) is necessary in the case of the following errors:

- ► Software crash
- ► Low contrast in display

Measuring point: con 112, Pin 2,3 against Pin 4,5 on controller board (A100)
Setting area: +5,00 V to +5,05 V
Setting point: R 7 on power supply unit (A300),
(Turn regulator to the right and voltage increases)

## 6.2 Valve on heat exchanger

**(See drawing "Valve cooling circuit")**

Setting of the valve is necessary in case of icing of compressor on the return connectors.

Screw off left side wall (5.1)

Other tool: Open end wrench, width 19 mm
Knife
Screw driver for recess screws, size 5.5 mm,
Clock
Material: Self-adhesive foam insulating tape (can be obtained in commerce)

The vale is insulated with foam and around the size of a fist.
It is below the fan (M002), directly on the heat exchanger.
According to the drawing "Valve cooling circuit " Position (5), the insulation of the valve is to be cut from the rear wall by approximately 5 cm. The visible protective cap (6) is to be removed.

Setting on the screw (7) depends on the icing area on the compressor (return connectors) per time unit and is to be carried out according to then following table:

| Icing area on compressor within 15 minutes (M002 is out): | Turn screw (7) to the right , **1 X ist 90 °, ¼ turn:** |
|---|---|
| < 10 $cm^2$ | 1 X |
| < 30 $cm^2$ | 2 X |
| < 100 $cm^2$ | 3 X |
| < 200 $cm^2$ | 4 X |

The test follows after setting. The device is switched on and permanent treatment is started. The fan M002 is off. The time in which the compressor operates is to be measured. The setting is completed in case of:

Operating time < 10 minutes at 25° C room temperature and no icing
Operating time < 12 minutes at 30° C room temperature and no icing

If these values are not complied with, setting is repeated.
Before the new measurement, the device must be de-iced (3.4). The process is automatically stopped, when the heat exchanger reaches + 8 °C.

After the setting, the cap (6) is screwed back onto the valve; the insulation is thoroughly closed and glued with additional insulating tape.

### 6.3 Temperature sensor

The temperature sensor is located behind the right side wall and is plugged into the heat exchanger with a screwed cable guide.
It can be removed by screwing out the cable guide and replaced.

**Control temperature sensor:**
Screw off right side wall (5.1)

Other tool: Screw driver for recess screws: size 3 mm
Resistance measuring device with test terminals
Measuring range 0.5 – 1.5 kOhm

The temperature sensor must be on the measuring area with a pressure in the heat exchanger:

► The cable guide must be screwed on. The cable for the temperature sensor is now movable. It is pressed into the heat exchanger with the cable.
Pressure is now used to screw the cable guide again.

Functional control:

► Loosen cable on X 019 and clamp to the resistance measuring device.

Resistance table of temperature sensor:

| T[°C] | R[Ohm] | T[°C] | R[Ohm] | T[°C] | R[Ohm] |
|---|---|---|---|---|---|
| -40 | 562 | -12 | 728 | 12 | 892 |
| -35 | 589 | -10 | 740 | 14 | 907 |
| -32 | 607 | -8 | 753 | 16 | 922 |
| -30 | 617 | -6 | 766 | 18 | 937 |
| -28 | 627 | -4 | 780 | 20 | 951 |
| -26 | 640 | -2 | 794 | 22 | 966 |
| -24 | 652 | 0 | 807 | 24 | 982 |
| -22 | 664 | 2 | 821 | 26 | 998 |
| -20 | 677 | 4 | 835 | 28 | 1014 |
| -18 | 689 | 6 | 849 | 30 | 1029 |
| -16 | 702 | 8 | 864 | 35 | 1070 |
| -14 | 715 | 10 | 877 | 40 | 1111 |

The device is switched on and permanent treatment is started. The fan M002 is off. The cooling system and temperature measurement function, when the following values are reached:

-30 °C  within 16 minutes to 24° C room temperature
-30 °C  within 19 minutes to 28° C room temperature
-30 °C  within 23 minutes to 32° C room temperature

## 7. Functional control

**Please comply with instructions for use.**

The nozzle 25 mm is to be used. Smaller nozzles are to be screwed from the handle.
Functional control is to be carried out in the order given, without interruption.

► Time operation: Set 1 minute, start, change air levels, air flow must change, fan (M002) switches off after 1 minute

► Permanent operation: start, change air level, air flow must change, Trigger level switch (S002) for water vessel (for example filling water into the water vessel, compressor and fan switch off and this message appears in the display: "Empty water vessel"

► Turn device off and back on after approx. 2 minutes:
Last operating mode appears on the display,
Compressor operates (measuring time) and switches off at:
< 16 minutes (room temperature to 24° C)
< 19 minutes (room temperature to 28° C)
< 23 minutes (room temperature to 32° C)

► Permanent operation: start, set air level 5, clock shows the treatment time.

► Temperature measurement:
after approx. 15 minutes of treatment:
(All systems and tube should be cooled, to obtain comparable measured values)
Place thermometer in the middle of the nozzle opening. It cannot be on the wall:
18° C room temperature: -12 °C ± 4 °C cold air temperature
24° C room temperature: -10 °C ± 4 °C cold air temperature
32° C room temperature: -6 °C ± 4 °C cold air temperature
(The measured temperatures depend on relative air humidity)

► Permanent operation: stop

► De-icing: start
(The process can be stopped only after approx. 3 minutes.)
The key "de-icing " is blocked for protection of the compressor at the beginning .)

► System setting: if settings, such as language, contrast, key tone, sound, "End of treatment" or signal level are to be changed, please proceed according to 5.4 of Instructions for Use.

**If only the temperature of cold air is to be measured, this procedure is to be followed:**

- Turn on device, start no treatment (heat exchanger is cooled)
- After 10 minutes, start permanent treatment, and set air level 5
- After 15 minutes of permanent treatment, measurement is to be done
- The 25 mm nozzle is to be used. Smaller nozzles are to be screwed from the handle. The thermometer is inserted in the middle of the nozzle opening. It cannot be on the wall.

(See measured values in this point, section "□ Temperature measuring")

## 8. Safety tests

Safety tests are performed according to EN 60 601-1 or IEC 601-1.

| | **Limit value** |
|---|---|
| ► 10 A-safety ground resistance measurement:<br>(safety ground of mains connection against touchable conductive housing parts) | < 0,2 Ohm |
| ► Ground lead off current NC: | < 0,5 mA |
| ► Ground lead current SFC: | < 1,0 mA |
| ► Insulation resistance (500 VDC):<br>(Plug pin of mains supply lead against touchable conductive housing parts) | > 2 MOhm |
| ► High voltage (50 Hz, 1 min):<br>(Plug pin of mains supply lead against touchable conductive housing parts) | 1.5 kV |

## 9. Maintenance instructions

Before performing all maintenance and repair work to **Cryoflow 700/1000,** the device must be switched off and removed from the mains. Device and accessories can be wiped with a dry or wet cloth. In case of hard-necked spots, use a non-aggressive soap solution.

**Attention: No moisture can get into the device or accessories.**
**Carefully dry all parts.**

The filter mat is to be washed regularly in soap solution or replaced. They can be simply removed from their location.
Please insert only dry filter mats.

The water vessel (behind the flap on the rear wall) is to be cleaned regularly with a soap solution.

We recommend area disinfectant based on aldehyde, alcohol, or quaternary ammonium compounds for the disinfection of device and water vessel.

Due to possible damage of the material, preparations based on halogen and oxygen splitting compounds, strong organic acids, solvents, benzene, acetone and similar substances are not suitable.

## 10. Measuring devices, tools and consumables (summary)

**Measuring devices:**

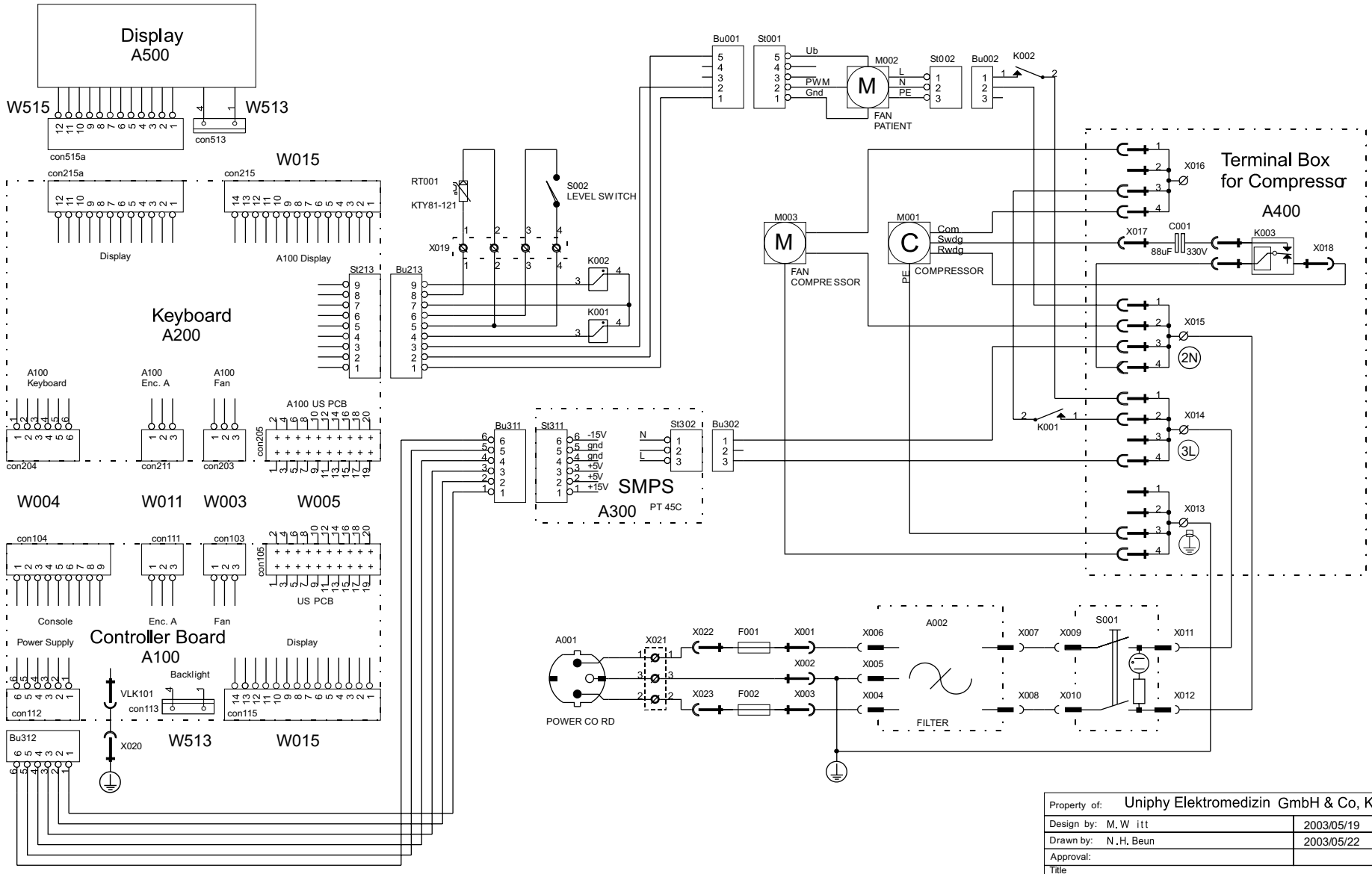
- Digital multimeter — Measuring range: 250 VAC, 10 AAC<br>20 VDC, 1ADC<br>Ohm, kOhm, MOhm
- Watch — (stop watch or wrist watch with second hand)
- Thermometer — Measuring range: -30 °C to +40 °C

**Tools:**

- Hexagon angle screw driver, for hexagon screws, size 2.5 mm
- Cross recess screw driver, Phillips: Size 1 and 2
- Screw driver for recess screws : Size 3 mm, 5.5 mm,<br>8 mm (air tube to M002)
- Open end wrench — Width 5 mm, 5,5 mm, 7 mm, 8 mm,<br>10 mm (tube connection to M002)<br>14 mm (safety holder),<br>19 mm (valve)<br>27 mm (mains line)

**Consumables:**

- Cable binders, 165 mm x 2.5 mm
- Zyanakrylat- glue (second quick glue)
- self-adhesive foam –insulating tape
- Filter mat

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|---|---|---|
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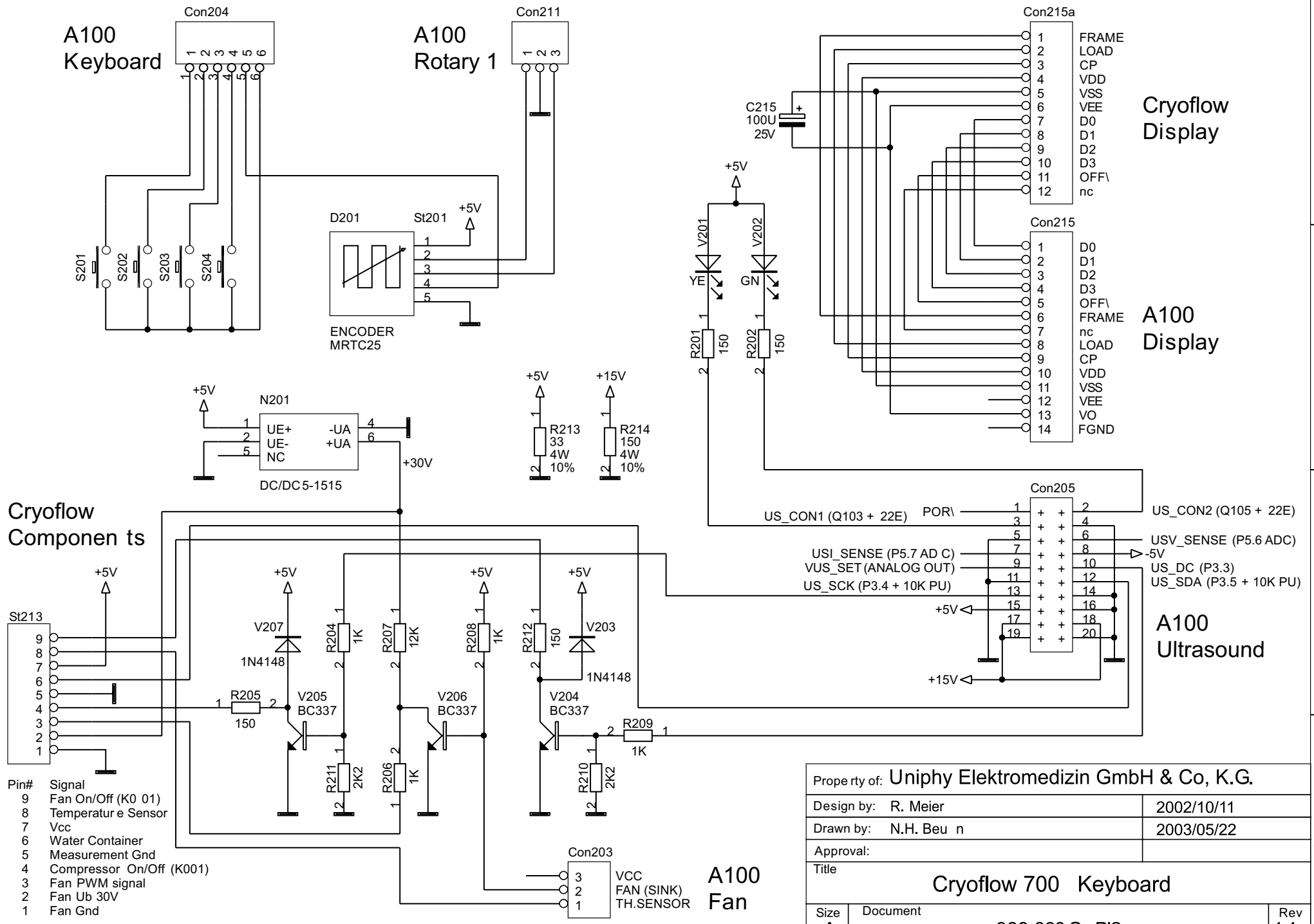
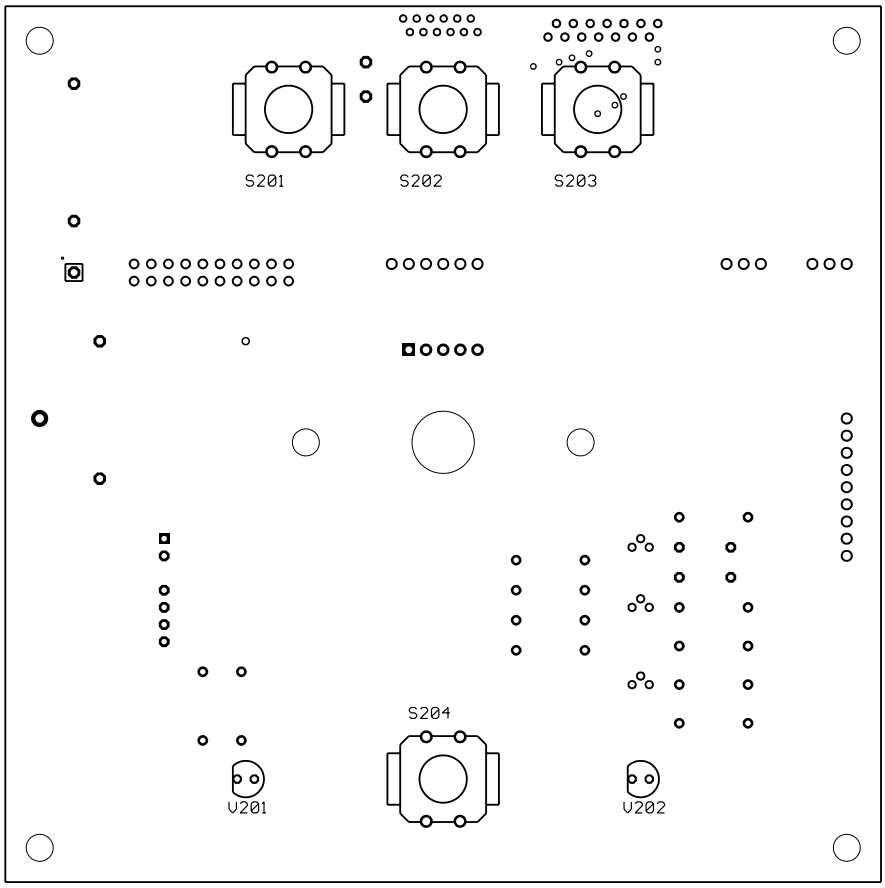
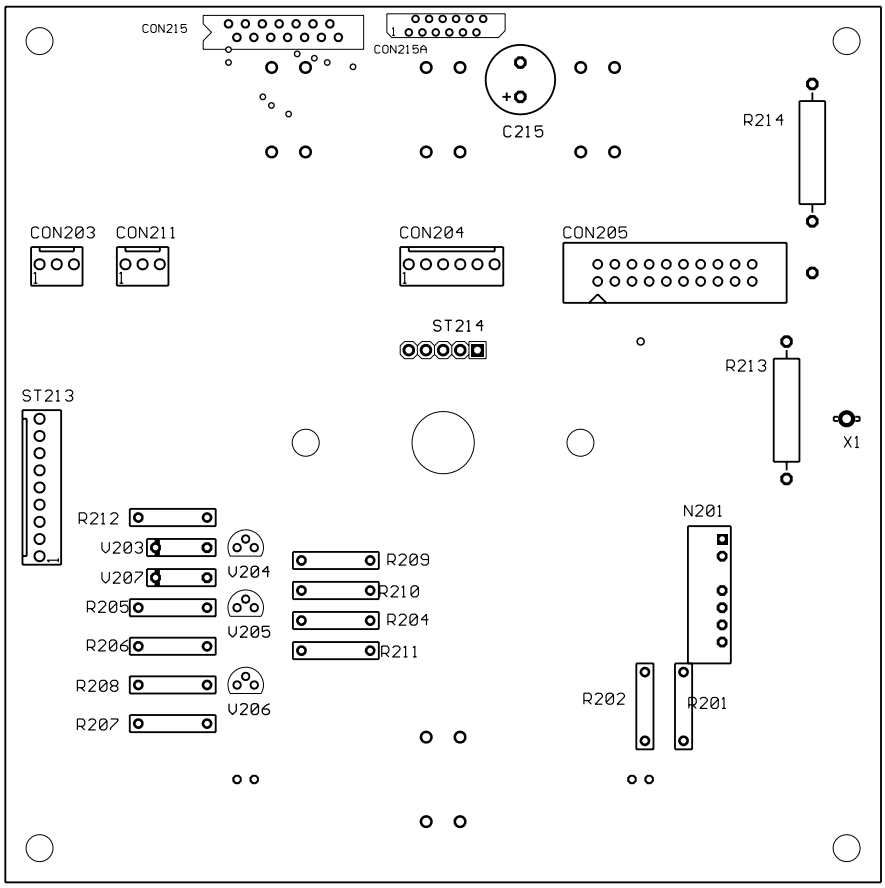
| Design by: | M. W itt | 2003/05/19 |
| Drawn by: | N.H. Beun | 2003/05/22 |
| Approval: | | |
| Title | Cryoflow 700 Unit Wiring | |
| Size: B | Document: 989.030 Sp Bl1 | Rev: 1.3 |
| | | Sheet 1 of 2 |




| | | |
|---|---|---|
| Prope rty of: | Uniphy Elektromedizin GmbH & Co, K.G. | |
| Design by: | R. Meier | 2002/10/11 |
| Drawn by: | N.H. Beu n | 2003/05/22 |
| Approval: | | |
| Title | Cryoflow 700 Keyboard | |
| Size: A | Document: 989.030 Sp Bl2 | Rev: 1.4 |
| | | Sheet 2 of 2 |

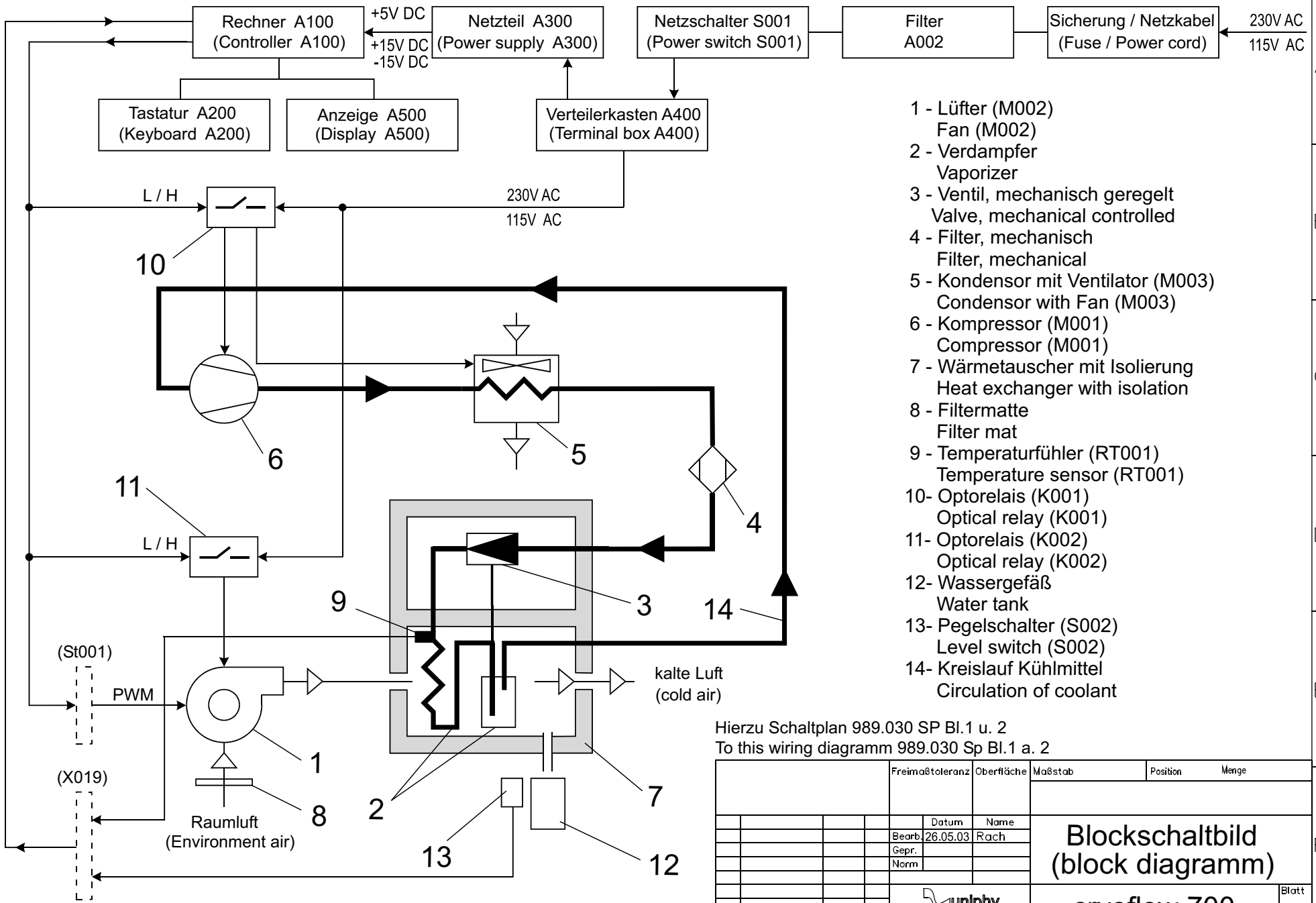



Anwenderseite
user side




Bauelementeseite
component side

| | | |
|---|---|---|
| ID:24-5008 | **Bestückung Tastaturleiterplatte (A200)**<br>**layout of components keyboard (A200)** | uniphy Elektromedizin |
| 09.06.03 | cryoflow 700 | |




1 - Lüfter (M002)
Fan (M002)
2 - Verdampfer
Vaporizer
3 - Ventil, mechanisch geregelt
Valve, mechanical controlled
4 - Filter, mechanisch
Filter, mechanical
5 - Kondensor mit Ventilator (M003)
Condensor with Fan (M003)
6 - Kompressor (M001)
Compressor (M001)
7 - Wärmetauscher mit Isolierung
Heat exchanger with isolation
8 - Filtermatte
Filter mat
9 - Temperaturfühler (RT001)
Temperature sensor (RT001)
10- Optorelais (K001)
Optical relay (K001)
11- Optorelais (K002)
Optical relay (K002)
12- Wassergefäß
Water tank
13- Pegelschalter (S002)
Level switch (S002)
14- Kreislauf Kühlmittel
Circulation of coolant

Hierzu Schaltplan 989.030 SP Bl.1 u. 2
To this wiring diagramm 989.030 Sp Bl.1 a. 2

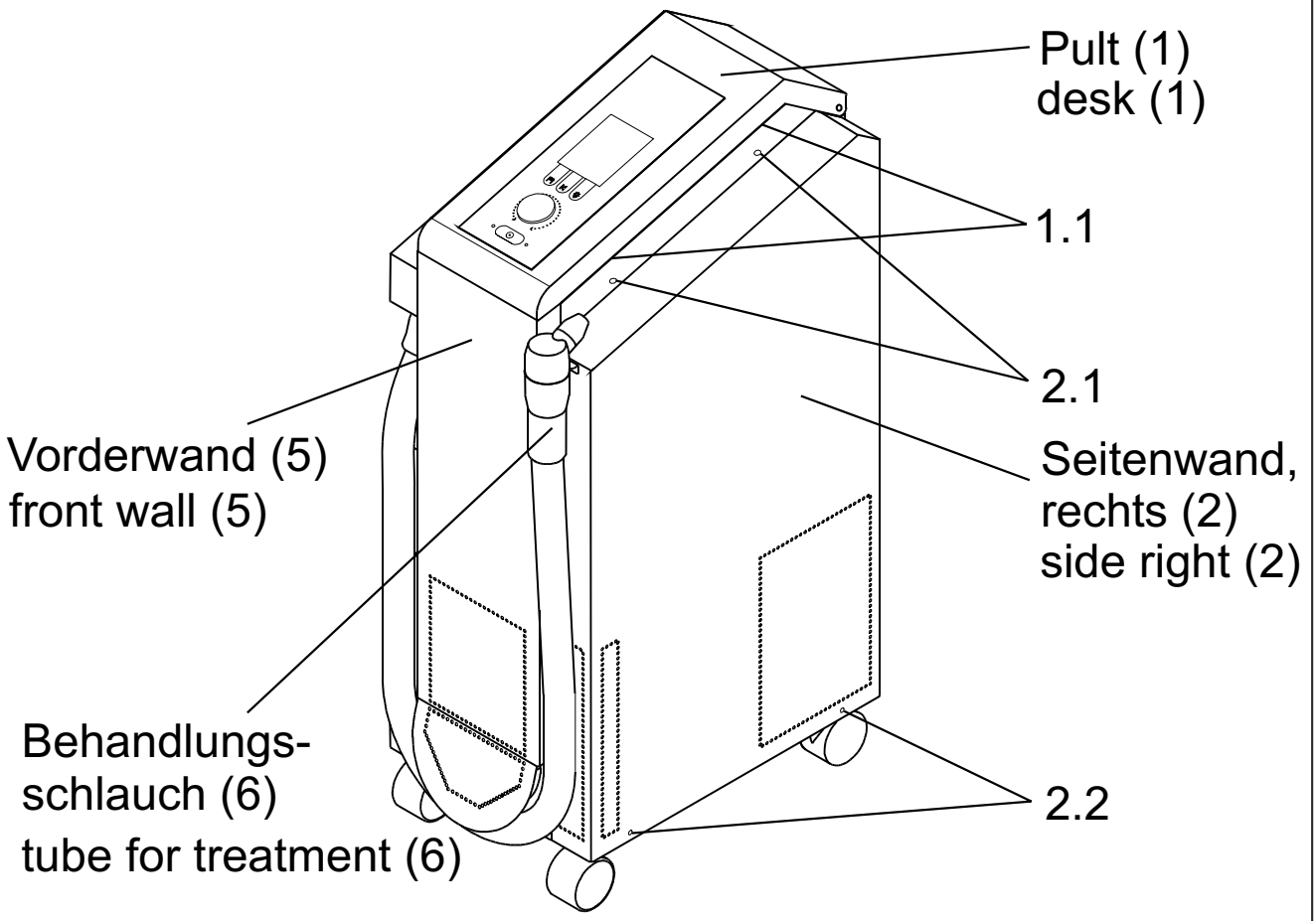
| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Freimaßtoleranz | Oberfläche | Maßstab | Position | Menge |
| | | | | | | | | | | | |
| | | | | | | | | Datum | Name | | |
| | | | | | | | Bearb. | 26.05.03 | Rach | | |
| | | | | | | | Gepr. | | | | |
| | | | | | | | Norm | | | | |
| | | | | | | | uniphy Elektromedizin | | | | |
| Zust. | Änderung | Datum | Name | | | | EDV Nr. | Fert Kalluft/Witt/Blockbild | | | |

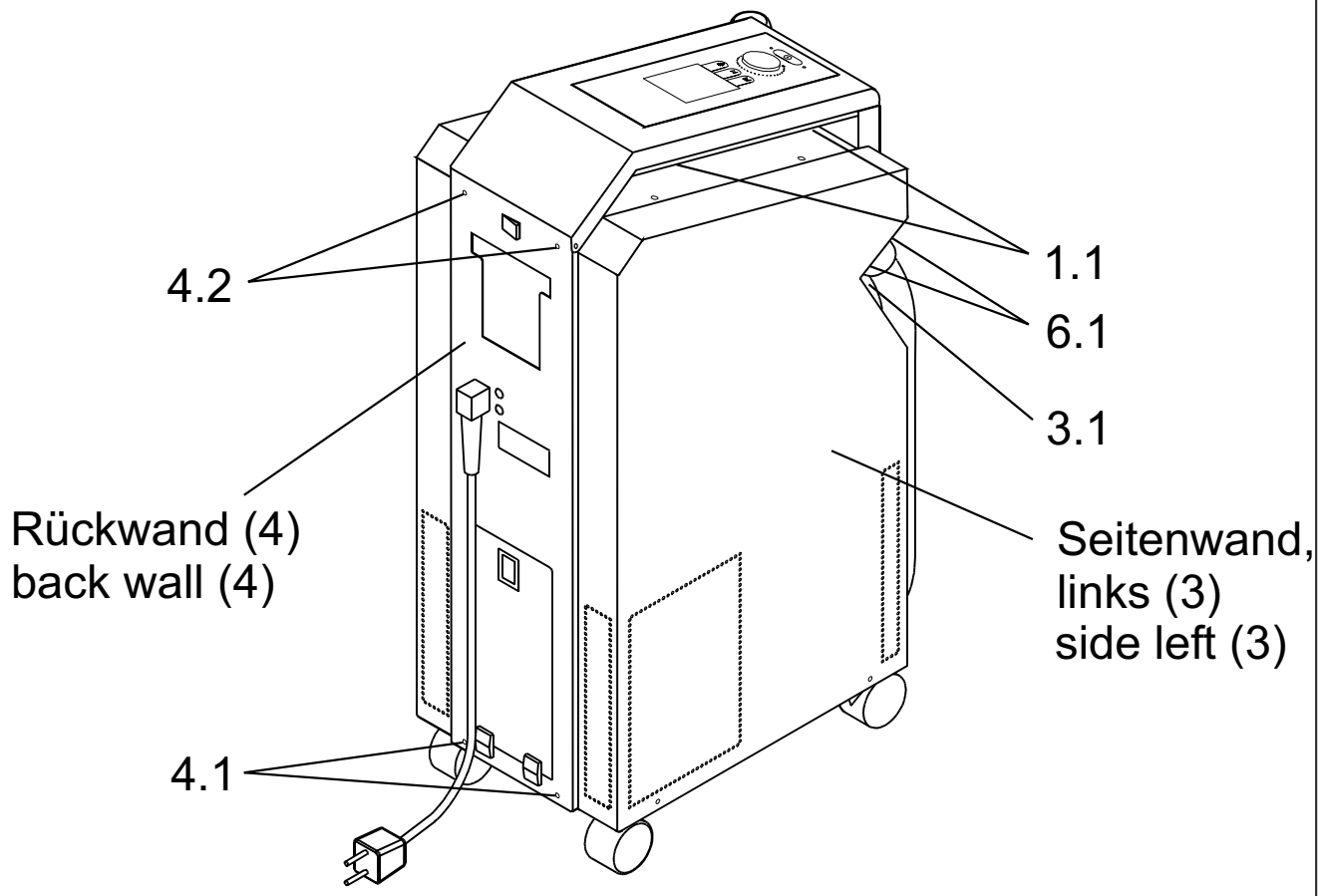
Blockschaltbild
(block diagramm)

cryoflow 700

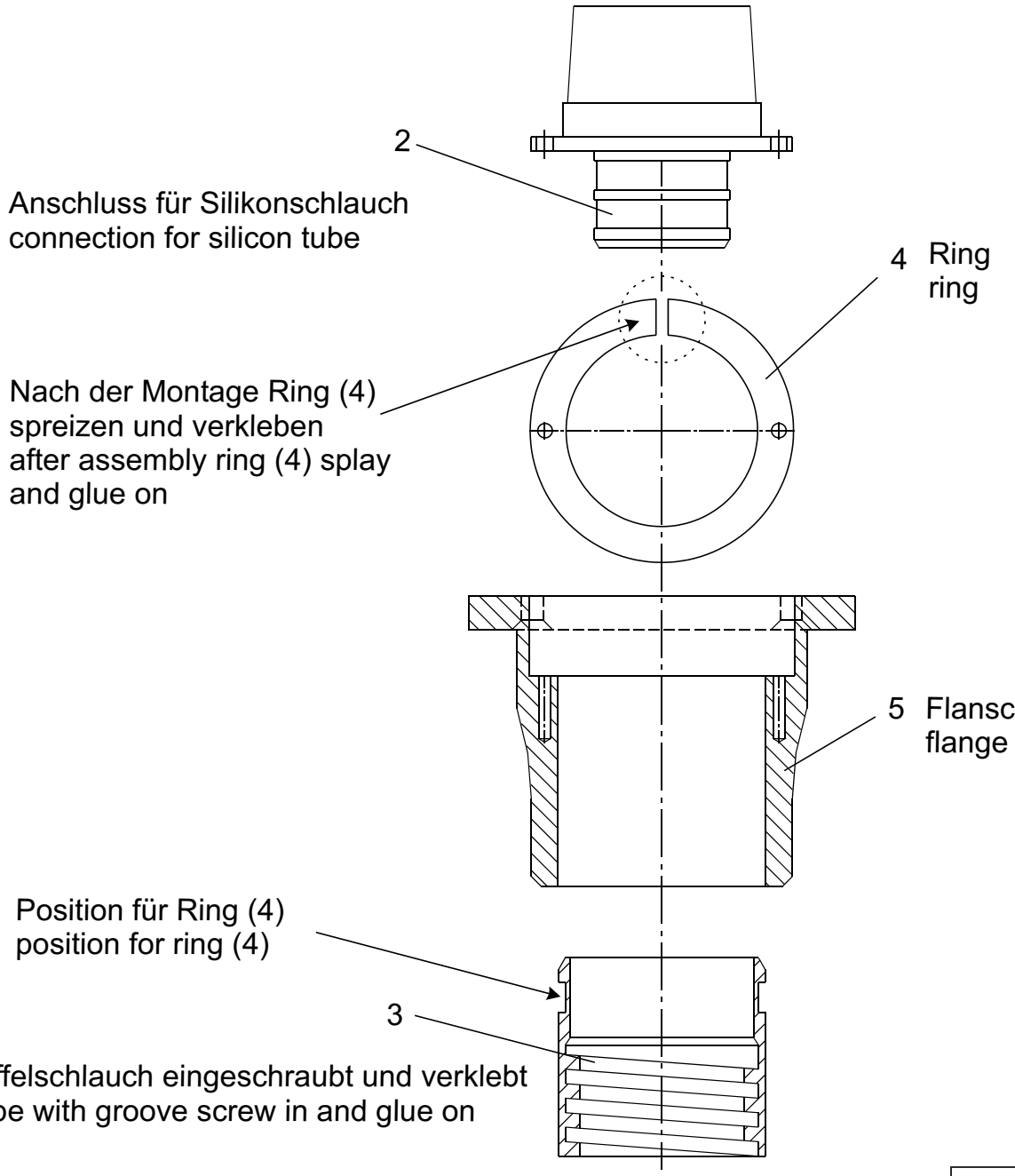
Blatt Bl

Alle Urheber- und Eigentumsrechte an diesem Blatt verbleiben bei uns. Unbefugte Verwendung kann strafrechtlich verfolgt werden.

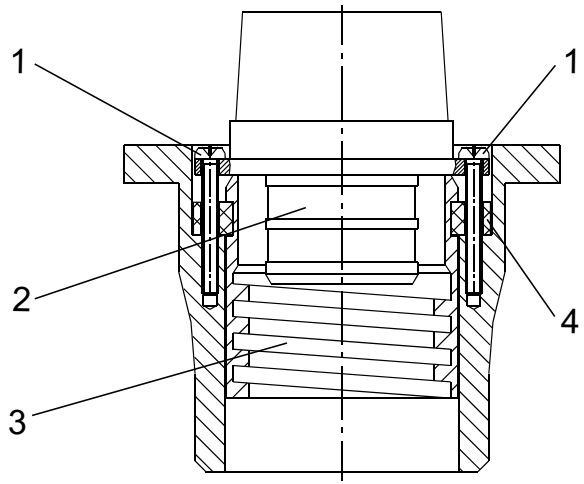


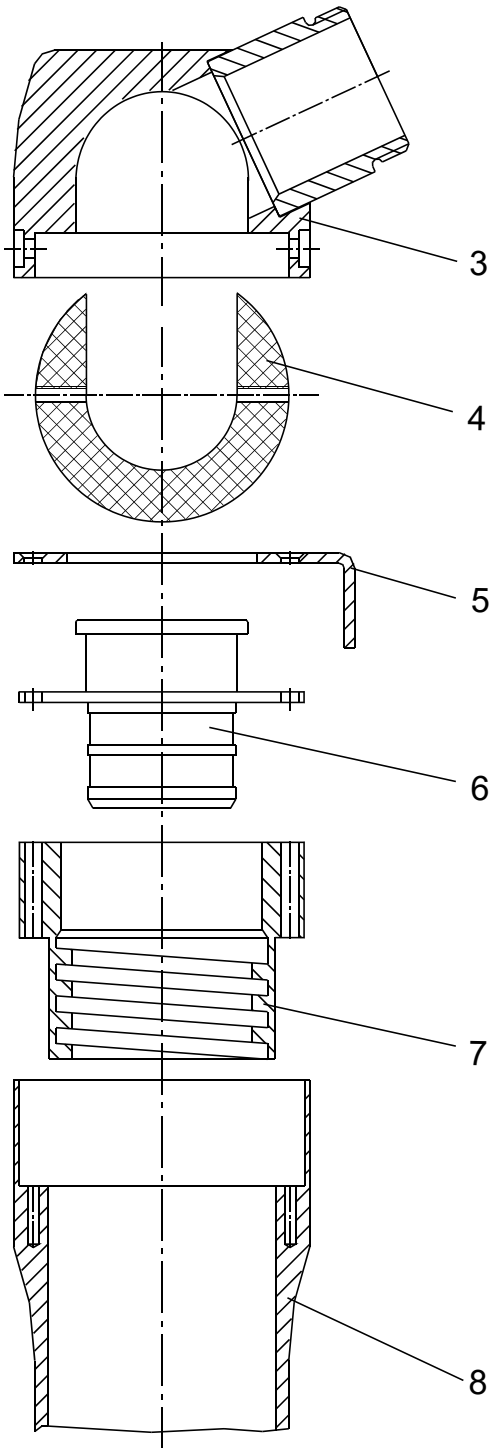

| | | | |
|---|---|---|---|
| | | **Demontage Gehäuse/Behandlungsschlauch**<br>**dismantling case / tube for treatment** | uniphy<br>Elektromedizin |
| 06.06.03 | | cryoflow 700 | |




Schlauchendstutzen (geräteseitig)
connection to device




| | | | |
|---|---|---|---|
| | | **Schlauchanschluss, Gerät**<br>**connection for tube to device**<br>cryoflow 700 | uniphy<br>Elektromedizin |
| 10.06.03 | | | |




3 Kappe
top

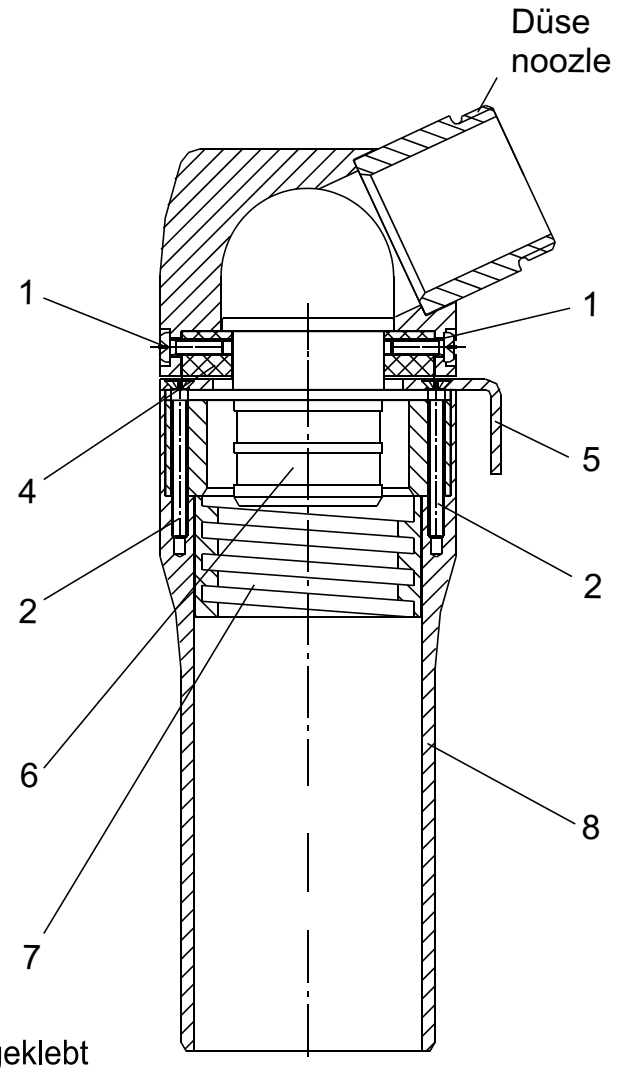
4 Klemmring
ring to clip

5 Haken
hook

6 Anschluss für Silikonschlauch
connection for silikon tube

7 Riffelschlauch eingeschraubt und geklebt
tube with groove screw in and glue on

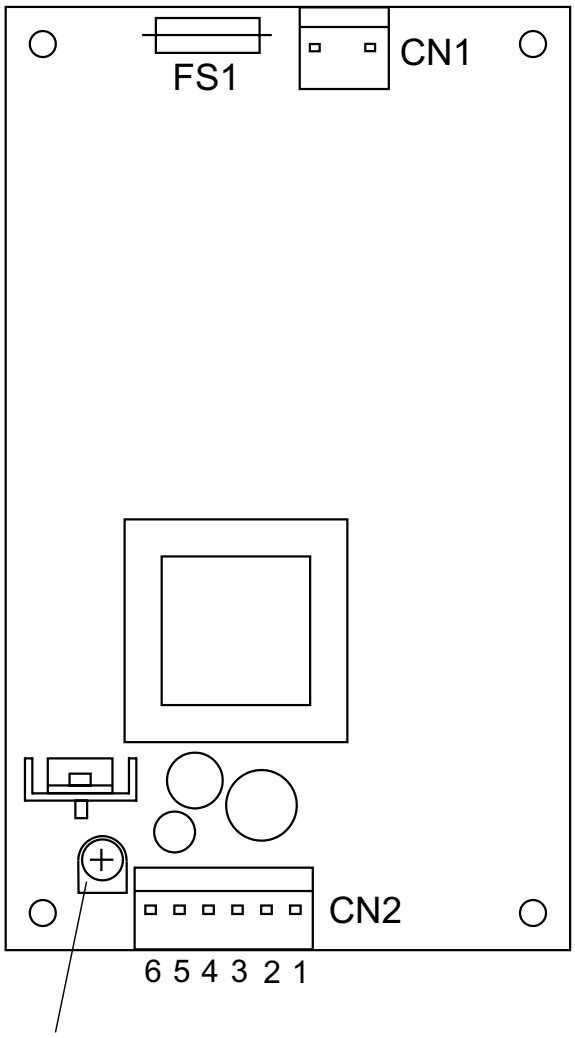
8 Griff
grip




1 Schraube M3x10
screw M3x10

2 Schraube 3x30
screw 3x30

| | | |
|---|---|---|
| 10.06.03 | **Handgriff**<br>**handle**<br>cryoflow 700 | uniphy<br>Elektromedizin |



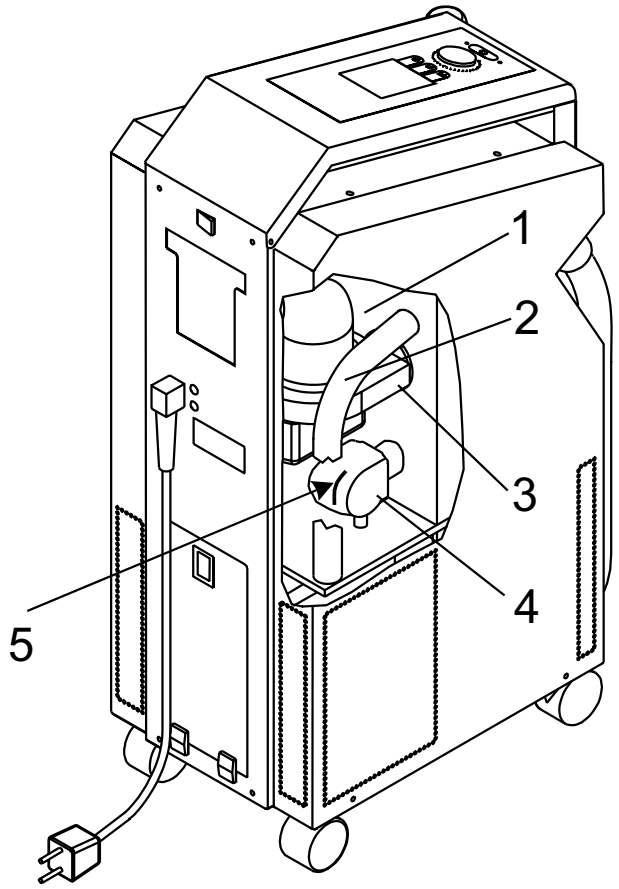

R7 - Einstellregler (variable resistance)

FS1: 4A, 250V

CN1: 100-240VAC, 1A

CN2: Pin 1 : +15V, 1,6A
Pin 2, 3: +5V, 3A
Pin 4, 5: GND
Pin 6 : -15V, 0,3A

Einstellung +5V: R7 nach rechts drehen, Spannung wird größer
Tuning +5V : R7 turn right, voltage becomes higher




1 Wärmetauscher, isoliert
Heat exchanger with isolation

2 Rücklauf Kühlmittel, isoliert
repatriation of coolant with isolation

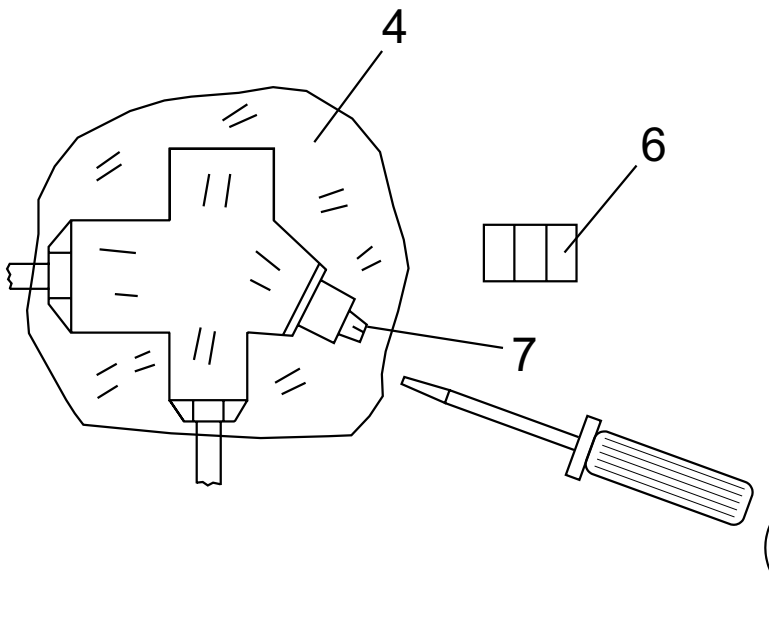
3 Lüfter (M 002)
Fan (M 002)

4 Ventil, isoliert
Valve with isolation

5 Isolation aufschneiden
Cut isolation to open

6 Kappe abschrauben
screw off top

7 Einstellschraube
screw to set




nach rechts drehen
turn to the right

| | | |
|---|---|---|
| 06.06.03 | **Ventil Kühlkreislauf**<br>**Valve circulation of coolant**<br>cryoflow 700 | uniphy<br>Elektromedizin |